Volume 15

Massachusetts Department of Public Health

Issue 96-2 Autumn 1996/Winter 1997

In this issue:

The Reporter

A publication of
the Division of Food and Drugs, Food Protection Program
and the Division of Community Sanitation

Table of Contents

Issue 96-2 Autumn 1996/Winter 1997

The Reporter is published by the Massachusetts Department of Public Health, Division of Food and Drugs, Food Protection Program and the Division of Community Sanitation. For further information on these and other topics, Food Protection Program staff may be reached by calling 617-983-6712 and Division of Community Sanitation staff may be reached by calling 617-983-6762.

This publication is sent to all Boards of Health in the Commonwealth. It is requested that a copy be circulated to all board members and interested employees. Other interested individuals and agencies may request a copy by contacting the Editor.

Please address all correspondence to: Joan L. Gancarski, Editor; The Reporter; Division of Food and Drugs; Massachusetts Department of Public Health; 305 South Street; Jamaica Plain, MA 02130, Telephone: 617-983-

Letter from the Directors:

Richard D. Waskiewicz, M. S., Division of Food and Drugs, Food Protection Program
Howard S. Wensley, M.S., C.H.O., Division of Community Sanitation

In February 1996, Executive Order 384 was signed pursuant to Governor Weld and Lieutenant Governor Cellucci's desire to review and modernize all state regulations. The order requires all agencies to sunset existing regulations on December 31, 1996, with only those existing regulations approved by the Secretary of Administration and Finance remaining in effect.

This Executive Order has provided the Massachusetts Department of Public Health (DPH) with the impetus for evaluating, modifying, rescinding, and retaining its regulations. The Division of Food and Drugs, Food Protection Program and the Division of Community Sanitation are reviewing and evaluating 45 of the 123 DPH regulations. The proposals outline and justify retaining the regulation, modifying the regulation, or rescinding the regulation. In August 1996, DPH began the comment and hearing process. The process should be finalized by March 1997.

In May 1996, the Division received a call from a nurse at a local hospital inquiring about a foodborne pathogen named *Cyclospora caytenensis*. As all members of the Food Protection Program staff were to find out, *Cyclospora* was soon to demand increased proportions of their workdays. As cases of the pathogen were confirmed, environmental investigations were initiated, and the U.S. Centers for Disease Control and Prevention (CDC) included Massachusetts in its environmental and epidemiological investigations of this pathogen. Daily, in coordination with the CDC, data was reviewed, summarized, and entered into a single, nationwide data base, where the data was tabulated, analyzed and disseminated. Also, as major newspapers printed articles and network TV news included stories about the association between Cyclospora and the consumption of raspberries and strawberries, hundreds of Massachusetts consumers called the Food Protection Program for additional information and to report suspected cases.

Finally, surveillance data implicated imported raspberries as the food which transmitted the *Cyclospora caytenensis.* The CDC with the federal Food and Drug Administration (FDA) are presently engaged in work to discover how

and why raspberries were contaminated with this specific protozoa parasite.

During the summer of ’96 the wheels started to turn on the FDA’s new mandatory Seafood Hazard Analysis Critical Control Point (HACCP) Regulation; a method of industry and government inspection designed to further control seafood safety. HACCP will rely on more industry self-regulation and preventive maintenance, with regulatory oversight. This regulation will begin to be enforced in December 1997. Massachusetts helped organize the three-day Seafood HACCP Train-the-Trainer session in Rhode Island and Maine for the Northeast Region, where selected individuals from industry, academia and regulatory agencies were provided guidelines and curriculum for standardized training of the seafood processing industry. These certified instructors will be training seafood processors throughout the Northeast Region. Training manuals were designed by the University of Florida Sea Grant Program in conjunction with the FDA. Industry trainings will be scheduled throughout the Northeast Region during 1997. Massachusetts is planning at least three industry training sessions, two are scheduled for Rhode Island, one for New Hampshire, one for Vermont and seven are scheduled for Maine. Mandatory HACCP plans must be in place by December 1997. After that time, regulators will include HACCP plan evaluations as part of their inspections.

Two oversubscribed and content-rich training conferences were recently completed. In September, in cooperation with the FDA, the Food Protection Program sponsored a two-day program entitled “Risk Communication.” In October 1996, the Division of Community Sanitation planned and coordinated a three-day program titled: “A Comprehensive Training Program for Housing Inspectors and Residential Building Managers.” This program was designed to represent a broad range of housing-related issues and perspectives. Each of the 300+ participants received a detailed reference resource manual assembled by the Division. This manual included materials outlining and detailing the subject areas addressed in the program. At the conference and within the manual, it was stated that DPH staff are available to answer questions and provide assistance. (617-983-6762)

In August, Bill Higson, Senior Food and Drugs Inspector, retired after 20 years employed in the Food Protection Program. Bill began working for the Division at the Fairhaven, MA, Seafood Office and Lab, and after five years was assigned to the Shellfish Unit in Boston. Bill will be missed by his colleagues as well as shellfish industry personnel in the southeastern part of Massachusetts, Cape Cod and the Islands.

Finally, we wish to bring to your attention the Crumbine Award. The Division of Food and Drugs strongly encourages local Boards of Health to consider applying for the 1997 Crumbine Award. For the past 41 years, this award has been presented annually to the local governmental health unit in the United States that has demonstrated unsurpassed achievement in providing food protection services to its community. Entry information is provided on pages 39-40. ❖

Mercury in Fish: Cause for Concern?

Judith E. Foulke
U.S. Food and Drug Administration
FDA Consumer- September 1994

Swordfish and shark taste great - especially grilled or broiled. But reports that these and some other large predatory fish may contain methyl mercury levels in excess of the Food and Drug Administration's 1 part per million (ppm) limit has dampened some fish lovers' appetites.

FDA scientists responsible for seafood safety are also concerned about the safety of eating these types of fish, but they agree that the fish are safe, provided they are eaten infrequently (no more than once a week) as part of a balanced diet.

Mercury is Everywhere

Mercury occurs naturally in the environment. According to FDA toxicologist Mike Bolger, Ph.D., approximately 2,700 to 6,000 tons of mercury are released annually into the atmosphere naturally by degassing from the Earth's crust and oceans. Another 2,000 to 3,000 tons are released annually into the atmosphere by human activities, primarily from burning household and industrial wastes, and especially from fossil fuels such as coal.

Mercury vapor is easily transported in the atmosphere, deposited on land and water, and then, in part, released again to the atmosphere. Trace amounts of mercury are soluble in bodies of water, where bacteria can cause chemical changes that transform mercury to methyl mercury, a more toxic form.

Fish absorb methyl mercury from water as it passes over their gills and as they feed on aquatic organisms. Larger predator fish are exposed to higher levels of methyl mercury from their prey.

Methyl mercury binds tightly to the proteins in fish tissue, including muscle. Cooking does not appreciably reduce the methyl mercury content of the fish.

Nearly all fish contain trace amounts of methyl mercury, some more than others. In areas where there is industrial mercury pollution, the levels in the fish can be quite elevated. In general, however, methyl mercury levels for most fish range from less than 0.01 ppm to 0.5 ppm. It's only in a few species of fish that methyl mercury levels reach the FDA limit for human consumption of 1 ppm. This most frequently occurs in some large predator fish, such as shark and swordfish. Certain species of very large tuna, typically sold as fresh steaks or sushi, can have levels over 1 ppm. (Canned tuna, composed of smaller species of tuna such as skipjack and albacore, has much lower levels of methyl mercury, averaging only about 0.17 ppm.) The average concentration of methyl mercury for commercially important species (mostly marine in origin) is less than 0.3 ppm. (See chart on page 7.)

FDA works with state regulators when commercial fish, caught and sold locally, are found to contain methyl mercury levels exceeding 1 ppm. The agency also checks imported fish at ports and refuses entry if methyl mercury levels exceed the FDA limit.

Sport-caught predator fresh-water species like pike and walleye sometimes have methyl mercury levels in the 1 ppm range. Other fresh-water species also have elevated levels, particularly in areas where mercury levels in the local environment are elevated.

FDA suggests sport fishers check with state or local governments for advisories about water bodies or fish species. These advisories provide up-to-date public health information

on local areas and warn of areas or species where mercury (or other contamination) is of concern. (See pages 11-15.)

Safety Studies

Eating commercially available fish should not be a problem, says FDA toxicologists. The 1-ppm limit FDA has set for commercial fish is considerably lower than levels or methyl mercury in fish that have caused illness.

For information about the likely outcome of eating fish with low levels of methyl mercury, scientists look to studies of persons exposed to high levels: in particular, studies of two poisoning episodes from highly contaminated fish in Japan in the 1960s, and another poisoning incident in Iraq in the 1970s involving contaminated grain.

In the first episode, which occurred in Minimata, Japan, 111 people died or became very ill (mostly from nervous system damage) from eating fish (often daily over extended periods) from waters that were severely polluted with mercury from local industrial discharge.

Following a similar incident in Nigata, Japan, where 120 persons were poisoned, studies showed that the harm caused by methyl mercury poisoning, particularly the neurological symptoms, can progress over a period of years after exposure has ended. The average mercury content of fish samples from both areas ranged from 9 to 24 ppm, though in Minimata, some fish were found to have levels as high as 40 ppm. Fortunately, no similar incidents have occurred in the United States.

The best indexes of exposure to methyl mercury are concentrations in hair and blood. The average concentration of total mercury in non-exposed people is 8 parts per billion (ppb) in blood and 2 ppm in hair. From the Japanese studies, toxicologists learned that the lowest mercury levels in adults associated with toxic effects (paresthesia) was 200 ppb in blood and 50 ppm in hair, accumulated over months to years of eating contaminated food.

The Japanese studies did not, however, provide information on what levels of methyl mercury might adversely affect the fetus and infant.

“There is no doubt that when humans are exposed to high levels of methyl mercury, poisoning and problems in the nervous system can occur,” Bolger says.

The types of symptoms reflect the degree of exposure. Paresthesia (numbness and tingling sensations around the lips, fingers and toes) usually is the first symptom. A stumbling gait and difficulty in articulating words is the next progressive symptom, along with a constriction of the visual fields, ultimately leading to tunnel vision and impaired hearing. Generalized muscle weakness, fatigue, headache, irritability, and inability to concentrate often occur. In severe cases, tremors or jerks are present. These neurological problems frequently lead to coma and death.

“During prenatal life, humans are susceptible to the toxic effects of high methyl mercury exposure levels because of the sensitivity of the developing nervous system,” Bolger explains. Methyl mercury easily crosses the placenta, and the mercury concentration rises to 30 percent higher in fetal red blood cells than in those of the mother.

“But none of the studies of methyl mercury poisoning victims have clearly shown the level at which newborns can tolerate exposure,” Bolger says. “It is clear that at exposure levels that affect the fetus, adults are also susceptible to adverse effects. What is not clear is the effect, if any, on fetuses at much lower levels - those that approach current exposure levels through normal fish consumption.”

Studies of the poisoning incident in Iraq have pro-

vided limited data about what effects low levels of methyl mercury exposures to the fetus have on the infant. One possible effect, for example, is lateness in walking. In the fall and winter of 1971-72, wheat seed intended for planting - and which had therefore been treated with an alkyl mercury fungicide - was mistakenly used to prepare bread; more than 6,500 Iraqis were hospitalized with neurological symptoms and 459 died. The vast majority of the mothers experienced exposures that resulted in hair levels greater than the lowest levels associated with effects in adults. But there was no clear evidence that the fetus was more sensitive than the adult to methyl mercury.

Another study in methyl mercury toxicity was published by the World Health Organization in 1990. It concluded, "the general population does not face a significant health risk from methyl mercury." Bolger says there is a consensus among scientists on all the results of this study except for the findings related to the relationship between low exposure levels and fetal toxicity.

Searching for More Information

FDA and the National Institute of Environmental Health Sciences are supporting a study by the University of Rochester to gather conclusive data on the effects of long-term exposure to low levels of methyl mercury in the fetus and infant. The study is being conducted in the Seychelles Islands, off the coast of East Africa in the Indian Ocean.

Fish is the major source of protein for people in the Seychelles islands. Begun about 10 years ago, the study focuses on the approximately 700 pregnancies that occur on the islands each year.

"That's a much more significant data-base than we had in the Iraqi study," says Bolger. "Also, the population is mostly Muslim," he says, a religion that prohibits smoking and drinking, behaviors that could affect the prenatal health of fetuses (and interfere with efforts to understand the subtle effects of methyl mercury).

The study tracks women from pregnancy to childbirth, and monitors the babies' consumption of breast milk. As children grow older, they are followed for any sign of nervous system disorders. Reports from the Seychelles study are not ready for publication, but Bolger expects the results to make a significant contribution to the consideration of whether further regulatory controls or other actions

Sample Results

Results of FDA sampling for methyl mercury by species for October 1990 to October 1991 (the action level is 1 ppm).

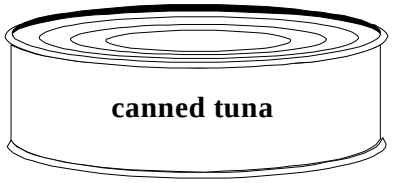
Fish Species	Range (ppm)
Bass, fresh water	0.15-0.34
Catfish, fresh and salt water	<0.10-0.31
Cod	Trace
Crabs	0.10-0.15
Croaker	0.13-0.32
Flounder	ND-0.08
Grouper	0.35-0.48
Haddock	Trace
Lobster	0.10-0.14
Mackerel	0.10-0.23
Mahi mahi (dolphin)	0.11-021
Marlin	0.10-0.92
Orange roughy	0.42-0.71
Oysters	<0.10
Perch, fresh water	ND-0.31
Perch, ocean (rosefish, red rockfish)	Trace-0.03
Pike	Trace-0.16
Pollock	ND-0.10
Salmon	ND-0.11
Shrimp	<0.10
Shark	0.23-2.95
Snapper, red	0.07-0.26
Swordfish	0.26-3.22
Trout	Trace-0.13
Tuna, canned	ND-0.75

ND means none detected

FDA Advice to Consumers

may be needed. ❖

Fish is an important source of high-quality protein, vitamins and minerals. FDA seafood specialists say that eating a variety of types of fish, the normal pattern of consumption, does not put anyone in danger of mercury poisoning. It is when people eat fad diets - frequently eating only one type of food or a particular species of fish - that they put themselves at risk.



Pregnant women and women of childbearing age who may become pregnant, however, are advised by FDA experts to limit their consumption of shark and swordfish to no more than once a month. These fish have much higher levels of methyl mercury than other commonly consumed fish. (See chart on page 7.) Since the fetus may be more susceptible than the mother to the adverse effects of methyl mercury, FDA experts say that it is prudent to minimize the consumption of fish that have higher levels of methyl mercury, like shark and swordfish. This advice covers both pregnant women and women of childbearing age who might become pregnant, since the first trimester of pregnancy appears to be the critical period of exposure for the fetus. Dietary practices immediately before pregnancy would have a direct bearing on fetal exposure during the first trimester, the period of greatest concern.

FDA toxicologists have determined that for persons other than pregnant women and women of childbearing age who may become pregnant, regular consumption of fish species with methyl mercury levels around 1 part per million (ppm) - such as shark and swordfish - should be limited to about 7 ounces per week (about one serving) to stay below the accept-

able daily intake for methyl mercury. For fish with levels averaging 0.5 ppm, regular consumption should be limited to about 14 ounces per week. Current evidence indicates that nursing women who follow this advice do not expose their infants to increased risk from methyl mercury.

Consumption advice is unnecessary for the top 10 seafood species, making up about 80 percent of the seafood market - canned tuna, shrimp, pollock, salmon, cod, catfish, clams, flatfish, crabs, and scallops. This is because the methyl mercury levels in these species are all less than 0.2 ppm and few people eat more than the suggested weekly limit of fish (2.2 pounds) for this level of methyl mercury contamination.

FDA's action level of 1 ppm for methyl mercury in fish was established to limit consumers' methyl mercury exposure to levels 10 times lower than the lowest levels associated with adverse effects (paresthesia) observed in the poisoning incidents. FDA based its action level on the lowest level at which adverse effects were found to occur in adults. This is because that level of exposure was actually lower that the lowest level found to affect fetuses, affording them greater protection.

Questions?

FDA invites consumers who have questions about methyl mercury in fish or other seafood concerns to telephone the 24-hour FDA Seafood Hotline at (1-800) FDA-4010 or (202) 205-4314 (in the Washington, D.C., area). The automated hot line and Flash Fax service are available 24 hours a day. Public affairs specialists can be reached at the same numbers from noon to 4 p.m. Eastern time, Monday through Friday. You may access most of the information on this line on the World Wide Web at HTTP:\VM.CFSAN.

FDA toxicologists are developing a more complete database for addressing low-level methyl mercury exposures from fish; however, they consider the 1-ppm limit to provide an adequate margin of safety. This doesn't mean that it is safe to regularly and frequently eat fish that contain 1 ppm methyl mercury. The limit was established taking into consideration the types of fish people eat, the levels of methyl mercury present in each species, and the amounts of fish

Seafood Safety Hotline

The U.S. Food and Drug Administration (FDA) Seafood Hotline can be reached by dialing 1-800-332-4010. This is a 24-hour automated information hotline that offers recorded messages and free educational material in English and Spanish. Topics include: safe seafood purchasing, handling, and storage. English-speaking specialists are available 12-4 EST, Monday-Friday. You may access most of the information on this line on the World Wide Web at HTTP:\VM.CFSAN.FDA.GOV, under all government servers. The Seafood Hotline also handles consumer complaints. ❖

Fact Sheet on Mercury in Freshwater Fish

Bureau of Environmental Assessment
Massachusetts Department of Public Health

What is Mercury?

Mercury is a naturally occurring metal found in the environment. Various compounds of mercury have been used in medicine and industry. Although medicinal uses have been discontinued, industrial uses of mercury are increasing.

How did mercury get into the Massachusetts environment?

Because mercury is naturally occurring in the earth's crust, natural land erosion may contribute to releases of mercury into the environment. Inorganic mercury may enter the air through burning of fossil fuels, mining, and waste or industrial emissions. Mercury released into the air can travel long distances and be deposited on soil and in water bodies.

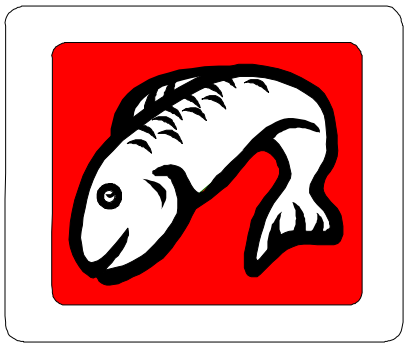
How does mercury get into freshwater fish?

In freshwater bodies, small organisms convert inorganic mercury to the organic form, methylmercury. Methylmercury enters the aquatic food chain by binding with particles and sediment eaten by fish. Larger fish may prey on smaller mercury-contaminated fish resulting in stored amounts of mercury in commonly caught fish. Fish eliminate mercury at a very slow rate; therefore, mercury tends to accumulate in their tissues and organs.

Is mercury found in every type of freshwater fish?

Mercury has been detected in most fish species sampled from freshwater bodies in Massachusetts and other states. However, the range is quite broad and varies by water body and by species of fish. Chain pickerel and large and smallmouth bass typically have the highest concentrations. Studies are in progress at this time to more accurately predict which species and locations are likely to have elevated levels of mercury.

Should I be concerned about exposure to mercury from eating freshwater fish?



People who consume moderate amounts of fish in a varied diet typically are not at risk of exposure to high levels of mercury. However, health effects of mercury may include damage to the nervous system in the unborn child. Pregnant women who have high amounts of mercury in their body pass some directly to the fetus. Because the effect mercury has on the nervous system is so well documented and because of the sensitivity of the developing fetus, the Massachusetts Department of Public Health recommends that, until more representative information is available, women refrain from consumption of freshwater fish while they are pregnant.

Have fish in all Massachusetts freshwater bodies been tested for mercury?

No. The process of catching and analyzing freshwater fish is time consuming and labor intensive. There are approximately 4,700 lakes, ponds, and rivers in Massachusetts. Of these, fish of various species in 132 water bodies have been tested from 1983 through 1995. (The number of water bodies which have been tested increases annually.) Limited data indicate that mercury has accumulated in some freshwater fish.

Should I be concerned about being exposed to mercury through swimming or other recreational activities in freshwater bodies?
No. There is no known health risk related to mercury from activities such as swimming, boating, or catch and release fishing in these waters. While mercury levels may be high in fish, the water concentration ranges typically as much as 100,000 lower. Handling fish will not likely expose individuals to elevated levels of mercury.

Do other New England states have this problem and have advisories?
Yes. All other New England states have tested for mercury in freshwater fish and mercury has also been detected in other New England states' freshwater fish population. Advisories of some type are in place for Maine, Connecticut, New Hampshire, and Vermont.

Does this advisory apply to consumption of marine (salt water) fish?
No. The mercury advisory does not apply to consumption of marine fish. Data available for Massachusetts suggest that most marine fish and shellfish sampled off Massachusetts shores have mercury concentrations approximately ten times lower than fish sampled in freshwater.

What can I do if I am concerned about past fish consumption habits?
You should discuss any health concerns with your health care provider. The Bureau of Environmental Health Assessment can provide additional information or discuss your individual situation. Alternative dietary advice is available that is tailored to your particular lifestyle.

Will there be changes in this advisory?
Changes in the current advisory may occur as new information becomes available. The current advisory is based on the current understanding of the toxicity of mercury. Should any information change, the advisory will be updated accordingly.

For more information on other advisories or if you have questions, contact:
Environmental Toxicology Program
Bureau of Environmental Health Assessment
Massachusetts Department of Public Health
617-624-5757. ❖

Freshwater Fish Consumption Advisory List

Bureau of Environmental Health Assessment
Massachusetts Department of Public Health
May 1996

Public Health Freshwater Fish Consumption Advisories

Water Body	Town(s)	Fish Advisory	Hazard
Ballardvale Impoundment of Shawsheen River	Andover	P1-LMB & BC, P3-LMB & BC	Mercury
Blackstone River above Blackstone Gorge	Blackstone	P1, P2-C & WS	PCBs
Cedar Swamp Pond	Milford	P1, P5	Mercury
Charles River (Between the Cochrane Dam in Natick and the Museum of Science Dam in Boston/Cambridge)	Boston, Cambridge, Dedham, Dover, Natick, Needham, Newton, Watertown, Weston, Wellesley, Waltham	P1-C, P3-C	PCBs
Clay Pit Pond	Belmont	P6	Chlordane
Cochato River, Icehouse Pond, and Sylvan Lake	Randolph, Holbrook, Braintree	P1, P2-BB & C & AE, P4	Pesticides
Concord River	Concord, Carlisle, Bedford, Billerica	P1, P2-LMB, P4	Mercury
Connecticut River	All towns between Northfield and Longmeadow	P1, P2-CC, WC, AE YP	PCBs
Copicut River, Cornell Pond	Dartmouth	P1, P2-AE, P3-LMB	PCBs, Mercury
Drinkwater River/Indian Head River and Factory Pond (1)	Hanson, Hanover, Pembroke	P6	Mercury
Gales Pond	Warwick	P1-YP, P3-YP	Mercury
Gibbs Pond	Nantucket	P1, P5	Mercury
Grove Pond (2)	Ft. Devens, Ayer	P6	Mercury
Heard's Pond	Wayland	P6	Mercury
Hocomonco Pond	Westborough	P6	PAHs
Hoosic River	N. Adams, Williamstown	P6	PCBs
Housatonic River (3)	All towns from Dalton to Sheffield	P1, P2-Frogs, Turtles, Fish	PCBs
Lake Cochituate	Framingham, Natick, Wayland	P1, P2-AE	PCBs
Lake Rohunta	Orange, Athol, New Salem	P1, P5	Mercury
Lake Winthrop	Holliston	P6	Dioxin
Martins Pond	North Reading	P1-LMB & BC & YP, P3-LMB & BC & YP	Mercury
Mashpee/Wakeby	Mashpee, Sandwich	P1-SMB, P3-SMB	Mercury
Merrimack River	All towns between Tyngsborough and Methuen	P1-WS & LMB, P3-WS & LMB	Mercury

Water Body	Town(s)	Fish Advisory	Hazard
Miacomet Pond	Nantucket	P1, P2-WP, P4	Mercury
Mill Pond	Westborough above GH Nichols Dam	P1, P2-LMB	Mercury
Mill River	Hopedale	P1, P5	PCBs
Millers River below Otter River	All towns from Erving to Winchendon	P1, P2-BT & AE, P4	Mercury, PCBs
Mirror Lake	Ft. Devens, Harvard	P1-LMB, P3-LMB	Mercury
Muddy River	Boston, Brookline	P1, P2-BB & C & AE, P4	PCBs
Neponset River between the Hollingsworth & Vose Dam in Walpole and the Tilestone Dam in Boston (Hyde Park)	All towns between Walpole and Boston (Hyde Park)	P1-BB, P3-BB	PCBs
Noquochoke Lake	Dartmouth	P1, P2-LMB & AE, P4	Mercury, PCBs
Otter River within ½ mile of Millers River	Templeton, Winchendon	P1, P2-WS & BB	PCBs
Pentucket Pond	Georgetown	P1, P2-LMB & BC, P4	Mercury
Pepperell Pond	Pepperell, Groton	P1, P2-LMB, P4	Mercury
Plainfield Pond	Plainfield	P1-LMB, P3-LMB	Mercury
Plowshop Pond (4)	Ft. Devens, Ayer	P6	Mercury
Pontoosuc Lake	Pittsfield, Lanesborough	P1, P3-LMB	Mercury
Powder Mill Pond	Barre	P1, P5	Mercury
Puffer Pond (2)	Ft. Devens, Sudbury Training Annex, Maynard	P6	Mercury
Quabbin & Wachusett. Reservoirs (5)	New Salem, Shutesbury, Petersham, Hardwick, Ware, Pelham, Belchertown, Boylston, West Boylston, Sterling, Clinton	see footnote (5)	Mercury
Quaboag Pond	E. Brookfield, Brookfield	P1, P2-LMB, P4	Mercury
Rice City Pond	Uxbridge-Northbridge	P1, P2-C	PCBs
Riverdale Pond	Northbridge	P1, P5	PCBs
Sherman Reservoir	Rowe, Monroe	P1,P2-YP, P4	Mercury
Sniptuit Pond and Long Pond	Rochester	P1-BC & LMB, P3-BC & LMB	Mercury
Somerset Reservoir	Somerset	P1-LMB, P3-LMB	Mercury
South Pond (Quacumquasit Pond)	Sturbridge, Brookfield, E. Brookfield	P1, P5	Mercury
Sudbury Reservoir	Marlborough, Southborough	P1, P2-Bass	Mercury
Sudbury River (6)	All towns between Ashland and Concord	P6	Mercury
Turner Pond	Dartmouth, New Bedford	P1, P5	Mercury

Water Body	Town(s)	Fish Advisory	Hazard
Upper Naukeag	Ashburnham	P1-SMB & YP, P3-SMB & YP	Mercury
Upper Reservoir	Westminster	P1, P5	Mercury
Waite Pond	Leicester	P1, P5	Mercury
Walden Pond	Concord	P1, P3-LMB & SMB	Mercury
Wequaquet Lake	Barnstable	P1-LMB, P3-LMB	Mercury
Willet Pond	Walpole, Norwood, Westwood	P1-LMB, P3-LMB	Mercury

Advice Codes

P1	Children younger than 12 years, pregnant women and nursing mothers should not eat fish from this water body.
P1-Species	Children younger than 12 years, pregnant women and nursing mothers should not eat any affected species from this water body.
P2-Species	The general public should not consume any affected fish species from this water body.
P3-Species	The general public should limit consumption of affected fish species from this water body to two meals per month.
P4	The general public should limit consumption of non-affected fish species from this water body to two meals per month.
P5	The general public should limit consumption of all fish from this water body to two meals per month.

Fish Codes

AE	American eel	CCS	creek chubsucker	RT	rainbow trout
BB	brown bullhead	CP	chain pickerel	SMB	smallmouth bass
B	bluegill	FF	fallfish	WC	white catfish
BC	black crappie	LMB	largemouth bass	WP	white perch
BT	brown trout	LNS	longnose sucker	WS	white sucker
C	common carp	LT	lake trout	YB	yellow bullhead
CC	channel catfish	P	pumkinseed	YP	yellow perch

Hazard Code PCBs Polychlorinated biphenyls PAHs Polycyclic aromatic

Notes

(1) Factory Pond Advisory has been updated (October 1995) to include the Drinkwater River/Indian Head River between the Forge Pond and the Luddam's Ford Dam, ands includes Factory Pond.
(2) U.S. Army issued advisories.
(3) Fish taken from feeder streams to the Housatonic River should be trimmed of fatty tissue prior cooking.
(4) Municipality issued advisory.
(5) Children younger than 12 years, pregnant women, and nursing wpmen should not consume fish except for lake trout (less than 24 inches long) and salmon. All other people should not eat the affected species, but may eat unlimited amounts of salmon and lake trout (less than 24 inches long) and limit consumption of all Quabbin and Wachusett Reservoir fish to one five-ounce meal per week.
(6) Sudbury River Fish Consumption Advisory pertains from Ashland to its confluence with the Assabet and Concord Rivers and includes the Stern and Bracket Reservoirs in Framingham. ❖

Vibrio vulnificus - A Significant Hazard in Molluscan Shellfish

William D. Watkins, Ph.D.
Office of Seafood
U.S. Food and Drug Administration

The association of molluscan shellfish consumption and infectious disease was first documented more than 40 years before Pasteur described the germ theory of disease (**1**). Today it is widely recognized that eating raw or partially cooked animal protein, especially molluscan shellfish, places consumers at significantly increased risk for gastrointestinal illness. Several species of *Vibrio* bacteria, capable of causing serious illness in humans, contribute to this risk. Among these, *Vibrio vulnificus* has achieved particular notoriety in recent year and continues to be of considerable concern.

V. vulnificus occurs naturally in estuaries and is found in coastal waters around the world. During warmer months large numbers of these bacteria can occur in the water column, in sediments, and on fauna and flora. First isolated from a severe wound infection in 1975 (**2**), this opportunistic pathogen has since been found to cause mild to acute gastroenteritis and sometimes a severe primary septicemia when ingested (**3**). The septicemic infections are frequently fatal.

Though comparatively rare, annual mortalities in the U.S. caused by ingested *V. vulnificus* continue to occur, and molluscan shellfish invariably have been implicated (**4**). For years oysters (*Crassostrea virginica*) were the only seafood implicated in virtually all U.S. mortalities caused by ingesting *V. vulnificus*, but two recent cases appear to have been caused by raw clams from Florida. In addition to food type, the disease syndromes caused by ingested *V. vulnificus* have distinctive elements of seasonal prevalence, regional occurrence, and predisposed victims.

At permissive temperatures *V. vulnificus* can grow and multiply rapidly, both in estuarine environments and shellfish (**5, 6, 7**). Warm weather months, from April through October, correspond to the period when the large majority (93%) of U.S. mortality cases caused by this bacterium have occurred (**8**). Nearly all cases have been related to the consumption of raw oysters from the Gulf coast (**4**). Moreover, it has been determined that the victims of virtually all mortality cases have had at least one important predisposing condition. Such conditions include liver disease and chronic alcoholism in particular (75%), blood disorders, immune system deficiencies, and diabetes (**9**). People with these maladies are deemed more highly susceptible and considered to incur significantly greater risk when they consume raw molluscan shellfish from the Gulf coast (**8**).

Victims of primary septicemia suffer from a variety of symptoms, which usually become manifest within 1-4 days after ingestion. Manifestations of *V. vulnificus* septicemia including fever and chills (90%), nausea (60%), abdominal pain (45%), vomiting (35%), and diarrhea (30%). Moreover, a distinctive condition frequently reported (70%) for *V. vulnificus* cases is the presence of painful skin lesions, particularly on the lower extremities. A sharp drop in blood pressure commonly occurs, sometimes leading to intractable shock and death (**10**). Primary septicemia caused by *V. vulnificus* progresses very rapidly. Patients require immediate, aggressive antibiotic therapy and supportive care, and tetracycline is the antimicrobial drug of choice. However, even with appropriate medical treatment, the majority of primary septicemia patients succumb. The median time between hospital admission and death is very brief, less than 48 hours (**9**). The limited success achieved by treatment underscores the importance of prevention.

Mode of Transmission and Severity of Infection

V. vulnificus is transmitted to consumers primarily via ingestion of molluscan shellfish, specifically oysters and clams. Surveillance data on *V. vulnificus* infections collected from Gulf coast states during 1988-1993 show that ingestion accounted for about 58% of the reported *V. vulnificus* infections. In all but perhaps one or two instances, shellfish on the half-shell were consumed raw. After ingesting *V. vulnificus*, consumers developing septicemia are at mortal risk. Surveillance data indicate a fatality rate of about 58%. By contrast, the fatality rate for people who suffered wound infections was 11%, although often non-fatal infections caused other serious complications for afflicted appendages. Overall, ingestion syndrome cases accounted for 83% of the *V. vulnificus* mortalities. No fatalities occurred from ingestion cases limited to gastroenteritis (**9**).

Risks Factors

Epidemiological surveillance data show that raw oyster consumption during the week prior to illness occurred for 95% of ingestion cases. Primary septicemia occurred in 80% of ingestion cases, and the risk for fatal outcomes stemmed solely from patients with primary septicemia. Demographically, septicemic patients are predominantly older (median age 56 years) caucasian (90%) males (94%), and approximately 75% of ingestion cases have revealed a history of liver disease or chronic alcoholism (**9**).

Without question, people with underlying health problems, such as liver disease, chronic alcoholism, blood and immune disorders, and diabetes, are at considerably greater risk than are healthy individuals. Virtually all U.S. mortality cases caused by *V. vulnificus* have been correlated with one of these predisposing conditions. Yet on an annual basis nationwide, relatively few of the high-risk consumers actually become ill, suggesting that different levels of susceptibility exist. The different levels of consumer susceptibility, and perhaps other as yet unknown factors, result in the occurrence of sporadic, single cases rather than multi-person (two or more cases) outbreaks typical of other water-borne and food-borne illnesses.

Based on data from Florida, estimates of risk for infection and mortality caused by *V. vulnificus* have been made (**8**). The risk for infection among adult raw oyster consumers without liver disease is 0.8 cases of per million. In contrast, the risk for infection among adult raw oyster consumers with liver disease is 74.1 cases of per million adults per year, a risk factor that is 88 times greater. The risk for infection among non-consumers of oysters, via wounds or other means, is 0.6 per million adults. This is a small but statistically significant difference from the risk to healthy oyster consumers. The difference in risk of mortality for raw oyster consumers with liver disease, relative to adults without, is even greater than the difference estimated for infection. These rates, 45.3 and 0.2 deaths per million adults per year, respectively, translate to a risk factor 192 times greater for consumers with liver disease.

Susceptibility and Predisposing Conditions

So far as is known, normal, healthy people have little risk of mortality from the estuarine *Vibrio* organisms. However, people with chronic illnesses and abnormalities affecting the liver, blood, and immune systems appear to be at considerably higher risk for *V. vulnificus*. Factors affecting liver function such as alcohol abuse, cirrhosis, and hepatitis have been most common among mortality victims. People having had a cholecystectomy, and those with iron storage disorders of the blood (such as hemochromatosis and hemosiderosis), AIDS, cancer, diabetes, kidney disease, low stomach acidity, or undergoing immunosuppressive therapy (such as transplant patients and other steroid users), also appear to be at high risk (**9**).

Infectious Dose and Pathogenicity

How many *V. vulnificus* will cause infection? How many will cause mortality? More to the point, how many *V. vulnificus* are safe to ingest? The answers to these and many other questions remain uncertain. In one case, consumption of a single raw oyster resulted in a fatal outcome. However, the actual level of *V. vulnificus* in implicated oysters has been difficult to ascertain. Rarely have oysters from the same lot as those consumed been obtained. In those few instances when samples have been retrieved, the inconstant factors related to storage times and temperatures, the use of dissimilar analytical methodologies, uncertainty about the amounts of oyster meat consumed by patients, and highly variable initial levels of the pathogen in oysters, have thwarted efforts to determine the doses responsible. Presumptive estimates of lethal dosage range as low as 11,000 viable *V. vulnificus* (**7**). It seems reasonable to deduce that, in actuality, infectious dose will vary inversely with the level of individual susceptibility. Based on ordinary summer levels found in oysters, a typical consumer eating a dozen oysters will ingest between 1.5 to 15 million viable, culturable *V. vulnificus*. Still, and even with a presumably large number of high risk consumers eating raw oysters annually, relatively few ingestion illnesses and mortalities occur. Averages made from surveillance data indicate that about 17 ingestion cases per year are reported, with about 58% of these being fatal (**9**).

In addition to the different susceptibilities among people, and among densities of the organism in oysters, variations among *V. vulnificus* strains also may be involved in whether a consumer will incur illness (**12**). This clearly is the case for *V. parahaemolyticus*, where two distinct biotypes exist. Pathogenic strains rarely have been detected in environmental samples, and the huge majority of isolates obtained are essentially nonpathogenic. It remains to be determined whether an analogous situation exists for strains of *V. vulnificus*.

Research endeavors to distinguish pathogenic *V. vulnificus* strains have involved a variety of classical and modern approaches. These include the use of animals models (**11**), serological typing, capsule typing, ribosomal typing, bacteriophage typing, and molecular profiling. (**12**). In the laboratory, *V. vulnificus* strains on solid agar media can display two distinct appearances. Opaque appearance is attributable to the presence of relatively thick polysaccharide capsules around the exterior of cells. Colonies appearing translucent have little or no capsule present. To date, the vast majority of clinical strains from patients have been encapsulated and opaque, whereas isolates from environmental samples have been comprised of both types, but predominantly opaque. However, phase variation between opacity (encapsulated cells) and translucence (not encapsulated) can occur within the same strain. The significance, if any, of these and other differentiations among *V. vulnificus* strains is not yet fully understood (**12**).

V. vulnificus produces many enzymes which can cause tissue damage. However, experiments using normal and mutant strains of this bacterium, animal models, and human blood and sera, suggest that no single enzyme is an especially significant factor in strain virulence. At present, it seems the ability of encapsulated cells to resist phagocytosis and the capacity of *V. vulnificus* for very rapid growth, especially in human blood and tissues, are significant factors in the pathogenicity of this species (**12**).

Ecology

The natural occurrence of *V. vulnificus* is unrelated to pollution, and this has made issues related to controlling this autochthonous hazard among the most difficult to resolve. Like most other *Vibrio* species (all except *V. cholerae O-1*) the organism is favored by a high pH and is halophilic, though it is not favored by the highly saline marine environment. It prospers mainly in estuarine habitats

and becomes abundant during warmer periods of the year. During the summer *V. vulnificus* is present in the water column, in sediments, on detritus, and on and in many species of plankton, fish, and shellfish. Densities as high as 1,000 per ml are not uncommon (**7**). Metabolically diverse, it serves a role in the ordinary catabolic cycling of nutrients in estuarine environs. Salinity and temperature are principal environmental factors in limiting the prevalence of this organism (**7**).

Cold stress induces cells of this mesophilic species to enter a state of metabolic dormancy, and cells become 'viable but nonculturable' (**13**). Thus, during winter months *V. vulnificus* is not readily detected by ordinary laboratory analyses, nor does it appear to cause septicemic illnesses in this nonculturable state.

V. vulnificus is part of the normal microbial flora of oysters. Cells of these bacteria are associated both on and in the tissues of oysters, including the mantle, gills, and digestive tract (**7**). During summer months, *V. vulnificus* can become the dominant microbial flora of oysters, reaching levels of more than 100,000 per gram (**7**). However, viable densities of *V. vulnificus* in Gulf coast oysters during summer months vary significantly, even among oysters comprising the same reef. Ordinarily summer levels range from about 100 to 100,000 per gram of oyster meat (**7**). Similar fluctuations and high densities also have been found in some New England oysters (**14**). *V. vulnificus* densities found in clams generally have been lower than those in oysters, between 10 and 1000-fold less.

Status of Hazard Prevention and Retail Food Safety

Gulf coast surveillance data on illnesses caused by *V. vulnificus* indicate that virtually all ingestion cases derived from oysters obtained from approved sources. Moreover, fully 85% of ingestion cases stem from oyster purchased at restaurants, 11% from other retail stores, and only 4% from wholesale sources (**8**). This information underscores the normal, natural occurrence of *V. vulnificus* in approved waters and shellfish, particularly during warmer months. It also points to post-harvest handling and consumer education as essential elements of prevention strategies.

Great importance is placed on the proper handling and cooling of shellfish once they are harvested, especially those from the Gulf coast. It is well established that *V. vulnificus* will grow in oysters at permissive temperatures during the period between harvest and processing, and that refrigeration below 10°C prevents growth of the organism (**15**). While icing shellstock oysters at harvest achieves such prevention (**16**), implementation of such a practice is commercially infeasible at present.

Various options to reduce viable *V. vulnificus* levels in shellstock oysters have been investigated in recent years, including relay and depuration, irradiation, and freezing. Depuration as currently practiced commercially is wholly ineffective (**17**). *V. vulnificus* is part of an oyster's normal flora, and levels simply do not significantly decrease during ordinary depuration. However, experimental results for relay/depuration into high salinity waters for one week or longer suggest that a large reduction in detectable *V. vulnificus* levels may be achievable (**18**). However, results of recent pilot studies along the Gulf coast achieved only minor decreases, and current logistics make this approach impractical on a commercial scale. Gamma irradiation can effectively reduce *V. vulnificus* levels in shellstock oysters (**19**), but the process has not yet received strong support from industry and still requires FDA pre-market approval. A combination of processing and freezing appears to offer a practical, effective means to substantially reduce *V. vulnificus* levels in oysters, and this method is now being used by some processors (**19**). However, fresh unprocessed oysters still comprise the vast majority of U.S. oysters

consumed on the half-shell.

In the absence of widely practiced, effective remedial measures to protect high risk consumers, educational and advisory efforts are paramount. Many educational outreach measures already have been made by a variety of organizations, including FDA, National Marine Fisheries Service, the Interstate Shellfish Sanitation Conference (ISSC), the Center for Disease Control and Prevention (CDC), and numerous state organizations, medical associations, consumer groups, and others. Such efforts have served to specifically target high risk consumers through a variety of specialty and multiplier groups, and also to inform and caution the general public about the risks inherent to consuming raw shellfish, especially *V. vulnificus*. Several states now require warning labels at the point of sale of raw molluscan shellfish advising consumers of potential risks, a measure recommended by FDA (**20**). Still, many people remain unaware of the risks. Some health-compromised individuals do not even know they have a predisposing condition which places them at greater risk. In addition, recent surveys suggest that advisory information on risk will not significantly alter the behavior of many risk-taking consumers. Though educational efforts are as yet incomplete and continue, it seems obvious that ultimately this approach will not fully solve the *V. vulnificus* hazard.

References:

1. Pasquier, J.P.A. 1818. Essai medicale sur le huitres, p. 49. *In* Collections des theses (soutenues) a la Faulte de Medecina de Paris, Tome Iluitieme 231 (vii), Paris.

2. Hollis, D.G. et al. 1976. Halophilic *Vibrio* species isolated from blood cultures. J. Clin. Microbiol. *3*:425-431.

3. Klontz, K.C., S. Lieb, and R.A. Gunn. 1988. Syndromes of *Vibrio vulnificus* infections: Clinical and epidemiological features in Florida cases, 1981-1987. Ann. Intern. Med. *109*:318-323.

4. Rippey, S.R. 1994. Infectious diseases associated with molluscan shellfish consumption. Clin. Microbiol. Rev. *7*(4):419-425.

5. Cook, D.W. 1994. Effect of time and temperature on multiplication of *Vibrio vulnificus* in post-harvest Gulf coast shellstock oysters. Appl. Environ. Microbiol. *60*:3483-3484.

6. Kaspar, C.W. and M.L. Tamplin. 1993. The effects of temperature and salinity on the survival of *Vibrio vulnificus* in seawater and shellfish. Appl. Environ. Microbiol. *59*:2425-2429.

7. Tamplin, M.L. 1995. The ecology of *Vibrio vulnificus*, p. 75-85. *In* Watkins, W.D. and S.M. McCarthy (eds), **Proceedings of the 1994 *Vibrio vulnificus* Workshop**. Second Printing. Office of Seafood, U.S. Food and Drug Administration, Washington, D.C. 175 p.

8. Hlady, G. 1995. Risk assessment and current data, p. 27-33. *In* **Proceedings of the 1994*Vibrio vulnificus* Workshop**.

9. Whitman, C. 1995. Epidemiology, p. 13-21. *In* **Proceedings of the 1994 *Vibrio vulnificus* Workshop**.

10. Kaysner, C. 1995. Case studies, p. 39-41. *In* **Proceedings of the 1994 *Vibrio vulnificus* Workshop**.

11. Oliver, J.D. 1995. Animal models, p. 57-62. *In* **Proceedings of the 1994 *Vibrio vulnificus* Workshop**.

12. Morris, J.G. 1995. Pathogenicity, p. 43-51. *In* **Proceedings of the 1994 *Vibrio vulnificus* Workshop**.

13. Wolf, P. and J.D. Oliver. 1992. Temperature effects on the viable but nonculturable state of *Vibrio vulnificus*. FEMS Microbiol. Ecol. *101*:33-39.

14. Miceli, G.A., S.R. Rippey, and W.D. Watkins. 1993. Direct plating procedure for enumerating *Vibrio vulnificus* in oysters. Appl. Environ. Microbiol. *59*:3519-3524.

15. Cook, D.W. 1995. Time-temperature factors, p. 87-97. *In* **Proceedings of the 1994*Vibrio vulnificus* Workshop**.

16. Tamplin, M.L. 1995. Icing at harvest, p. 117. *In* **Proceedings of the 1994 *Vibrio vulnificus* Workshop**.

17. Tamplin, M.L. 1995. Oyster purification and invention measures, p. 101-104. *In* **Proceedings of the 1994*Vibrio vulnificus* Workshop**.

18. Jones, S.H. 1995. Relaying, p. 105-109. *In* **Proceedings of the 1994 *Vibrio vulnificus* Workshop**.

19. Kilgen, M. 1995. Other Gulf coast oyster research, p. 111-116. *In* **Proceedings of the 1994*Vibrio vulnificus* Workshop**.

20. U.S. Department of Health and Human Services. 1995. **Food Code**. U.S. Food and Drug Administration, Washington, D.C.❖

Question and Answers: Local Health Unit

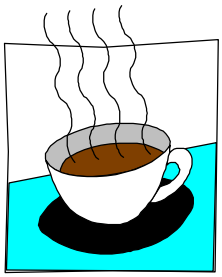
Priscilla Luongo, R.S.

Q. Are open-air cafes permitted in Massachusetts?

A recent physical facility design trend seen in food service establishments in Boston and other Massachusetts communities is the European-style open-air cafes. Most of these cafes have garage-like doors which open wide to the outdoors with no screens. Such a design violates Section 590.021(B) **Openings** in Massachusetts Regulation 105 CMR 590.000- Minimum Sanitation Standards for Food Establishments - Article X. According to the federal 1995 Food Code (U.S. Public Health Service, FDA), it appears that such cafes would be acceptable provided there were no flies.

Pests such as flies, cockroaches and rodents are known vectors of disease. Basic sanitation practices have always required that food establishment doors and windows be constructed, maintained and used in a manner to preclude the entry of such pests. Without adequately screened doors or windows, pest infestation is possible.

Pests are not normally implicated in foodborne outbreaks and the potential for significant contamination by a few flies is relatively small. However, since insects are vectors of disease and are more prevalent in warmer weather, measures must be taken to preclude pest infestation (particularly flies) where food is left unprotected during storage, preparation and display for service.



To conduct an operation of this type, a plan should be developed that encompasses the following items:

1. Establishments which desire such open-air cafes must request a variance from the local board of health.

2.While a few flies in the dining area may not be significant, they should be debited as a violation if noted where food is unprotected during storage, preparation and display for service.

3. Areas in which food and food contact surfaces are left uncovered or unprotected during storage, preparation or display for service must be protected with screens, tight fitting doors or air curtains.

4. Pest harborage areas such as garbage barrels, dumpsters and grease receptacles must not be near open doors or windows.

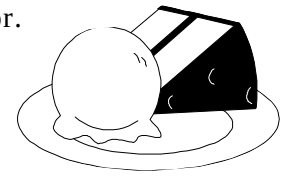
5. Such establishments must have excellent sanitation practices and should institute extra precautionary pest control measures when necessary.

➔

Q. Should food workers always wear gloves when handling cooked and ready-to-eat foods?

Food workers with poor hygienic practices are often implicated as a contributing factor in foodborne illness outbreaks.

Massachusetts regulation 105 CMR 590.000 - Minimum Sanitation Standards for Food Establishments - Article X, requires that food be prepared with a minimum of manual contact. The Massachusetts Department of Public Health Division of Food and Drugs' interpretation of that provision is to enforce the use of utensils, single-use papers and disposable gloves when possible to avoid bare-hand contact with ready-to-eat foods. The federal 1995 Food Code (U.S. Public Health Service, FDA) clearly states that there shall be no bare hand contact with ready-to-eat foods. Both the Division's interpretation of minimized food handling and the FDA's no bare-hand contact with ready-to-eat food provision allow other methods to create physical barriers. The type of physical barrier can be decided upon by the food establishment operator. Utensils, tongs, spatulas, and deli papers may be as effective as gloves, and pose less risk of cross-contamination.



The improper use of gloves can cause additional contamination if employees are not trained and carefully monitored. The warm, moist environment created by wearing plastic gloves for extended time periods can increase the levels of bacteria such as *Staphylococcal aureus* on a food worker's hands. When using gloves, food workers should change them frequently between operations, and wash their hands after removing the gloves. When employees are required to wear gloves at all times, they tend to keep them on through various activities, such as handling raw foods, removing garbage, and touching fomites (inanimate objects which may harbor pathogenic organisms) before handling ready-to-eat foods.

When gloves are used at all times, it is difficult for food service managers or public health professionals to continuously monitor and determine if disposable gloves have been used properly or are the source of cross-contamination. Food establishment managers and supervisors must constantly monitor food workers preparing, handling, and serving ready-to-eat foods to ensure adequate hand washing and proper use of disposable gloves.

In addition, the state and federal bare-hand contact requirements address ready-to-eat foods, and not raw foods which require further cooking or pasteurization. Since bacteria and viruses are very susceptible to heat, adequate cooking temperatures should easily destroy contamination which may be introduced when the food was raw. The key element to offset foodborne illness is to cook raw foods adequately, and **prevent** post-cooking and post-processing contamination by the use of physical barriers.

The focus of employee hygienic practices should be on health, hand washing, and proper food handling practices, particularly the avoidance of touching ready-to-eat foods with bare hands. While gloves, if used properly, can be an excellent physical barrier to cross-contamination, gloves are not the only solution and, in certain situations, may actually increase the risk of cross-contamination.

Q. Can the local board of health issue

a variance to permit the self-service of raw individually quick frozen (IQF) shell-on shrimp in a retail food store?

Such a practice now conflicts with provisions of 105 CMR 590.031(A)(2) **Self-Service Bulk Foods** and Section 3-306.13 **Consumer Self-Service Operations** of the federal 1995 Food Code (U.S. Public Health Service, FDA). Raw animal foods are common sources of pathogens which can result, if not properly handled, in cross-contamination of ready-to-eat foods. For example, consumers may handle the raw frozen shrimp and then cross-contaminate ready-to-eat foods such as produce. Consumers may also inadvertently contaminate the shrimp during dispensing.

Overall, the self-service of raw IQF shell-on shrimp appears to be a low-risk operation based on the following factors:

Shrimp is frozen shell on, and the shell is removed prior to cooking.

Shrimp is coated in a thin layer of ice and kept frozen from receiving through point-of-sale. Since there are no raw juices, it can be argued that the potential for contamination is much less for this operation than for refrigerated meat and poultry products in leaky packages.

Contamination of or by a consumer's hands is minimal if a dispensing utensil is provided and properly used.

Since shrimp is normally cooked prior to consumption, potential bacterial and viral contaminants introduced by customers would likely be destroyed.
To conduct such an operation, a food establishment must apply for a variance from the local board of health (LBOH). The following information must be provided to the LBOH by the retail food establishment petitioning for such a variance:

1. Plan Review

The variance must be accompanied by a physical facility plan of the operation pursuant to 105 CMR 590.058 **Review of Plans**. The plan must indicate equipment layout and specifications.

2. HACCP Food Safety Plan

The retail food establishment must submit a Hazard Analysis Critical Control Point (HACCP) plan which addresses the following:

- Menu (limited to raw unpeeled IQF shell-on shrimp)
- Food Source (received frozen)
- Storage
- Food Protection in Display Case (i.e., cover, shield, sneeze guard, etc.)
- Temperature Control (kept frozen from receiving to point-of-sale)
- Rotation
- Cleaning And Sanitizing Schedule For Freezer Unit, Scale, Dispensing Utensils, etc.
- Employee Responsibilities and Training
- Signs❖

Flavored Oils: Long on Flavor, Short on Safety

from Risky Business
produced by UVM Extension System and UNH Cooperative Extension
and
supported by Cooperative State Research, Education, and Extension Service

The preparation and use of flavored oil is becoming very popular in the United States. Flavored oil - which has been part of many old world cultures, such as Mediterranean and Middle Eastern for centuries - may be the rediscovered food of the '90's. because of their popularity, the high cost of commercially prepared products, and the relative ease of preparation, flavored oils are being prepared and served in homes, restaurants, and other food service establishments. recipes for preparing flavored oils are currently available in many food and cooking magazines.

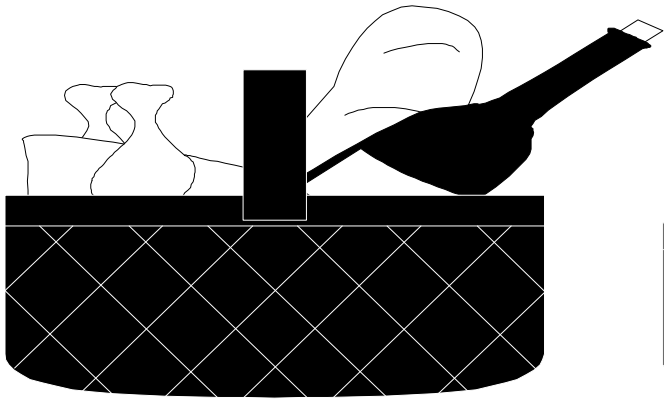
Many of these recipes are long on flavor and taste, but very short on safety. Flavored oils pose a potential risk of botulism - a serious foodborne illness - caused by growth and toxin production of of *Clostridium botulinum* bacteria and must be handled safely .

If you prepare or serve flavored oils, you should be well informed about botulism and what conditions promote it. The *C. botulinum* organism is a natural part of our environment. It is one of many bacterial organisms and spores that are part of the bacterial flora naturally present in soils. Many of the fresh herbs and vegetables used in preparing flavored oils are low acid and high water-activity foods. As such, they will support growth of *C. botulinum* when prepared in oil which provides the perfect anaerobic (oxygen-free) environment for these bacteria to grow and produce toxin.

Two Factors Must be Considered

- Two important concepts relating to food safety have to be considered in the safety of flavored oils.

- One is **water activity**, which is a measure of the available water in a food. because moisture is one of the required factors for bacterial growth in food, the importance of water activity of a specific food relates to the ability of microorganisms to grow in it. Vegetables added to oil can introduce a source of water not usually present in the oil.



- The second important factor to consider is the **acidity** of the food, measured by the pH. Microorganisms are sensitive to acid; some much more than others. Acid, in the form of citric acid and phosphoric acid, can be added to food; or the food itself (such as citrus juice) can be naturally high in acids. The ability of these acids to act as a food preserver differs considerably. Vegetables (such as garlic and herbs) added to oil are generally low in acid.

If you chose to use time only to ensure the safety of these mixtures for your customers, the period of four (4) hours is generally recognized as the scientific standard for which potentially hazardous food may be held in the danger zone between 41°F and 140°F.

The 1995 FDA Food Code states that the product must meet these requirements

- The food must be marked or otherwise identified with the time within which it shall be cooked, served, or discarded.
- The food must be served or discarded within 4 hours from the point in time when the food is removed from temperature control.
- Food in unmarked containers or packages, or for which the time expires, must be discarded.
- Written procedures must be maintained in the food establishment and made available to regulatory authorities when requested.

Simply stated, if you make your own garlic-in-oil mixture, it should be produced and used within 4 hours at room temperature. If it is left on restaurant tables or salad bars, it should be replaced every 4 hours and leftovers should be discarded.

Follow Same Guidelines for Herb-&-Oil Mixtures

Whether herb and oil mixtures are considered potentially hazardous depends on the water activity of the herb. Unless these products have been analyzed to determine pH and water activity and approval obtained from the appropriate regulatory agency, they should be handles as recommended above.

Observing these food safety principles will ensure that your customers enjoy these flavored oils without the worry of foodborne illnesses. ❖

Sources:
El-Begearmi, M. "Flavored Oils: For Safety Sake!" **Food Safety Communicator**. University of Maine Cooperative Extension. Winter/Spring, 1995.
Food and Drug Administration. Personal communication (May 1996) and correspondence by J. Schrade, Regional Food Specialist, Northeast Region (March 21, 1996)❖

Special thanks to Catherine Violette of the University of New Hampshire Cooperative Extension and Mahmoud El-Begearmi of the University of Maine Cooperative Extension.❖

Pursuant to Massachusetts Regulation 105 CMR 590.003(A)(1) Food Protection and 105 CMR 590.006(A) Potentially Hazardous Food (PHF), flavored oils which fall within the definition of a PHF must be maintained at or below 45ºF during preparation, storage and display.

Until Massachusetts adopts the federal Food Code, which may include time as a public health control, the Division will allow such oils to be held at room temperature for up to four (4) hours provided they are time-marked and used or discarded after that time. ❖

Food Labeling: Questions and Answers
A Guide for Restaurants and Other Retail Establishments
from the Federal Register, September 19, 1995

The federal Food and Drug Administration (FDA) has received a number of inquiries from industry, consumers, and others concerning how the regulations it has adopted, implementing the Nutrition Labeling and Education Act of 1990 (the 1990 amendments) apply to retail Food establishments, including restaurants. FDA has prepared a document entitled "Food Labeling: Questions and Answers Volume II; A Guide for Restaurants and Other Retail Establishments" to serve as general guidance on the regulations.

"Food Labeling: Questions and Answers Volume II; A Guide for Restaurants and Other Retail Establishments" is intended only to be guidance to facilitate compliance with the regulations. It does not bind the agency, nor does it create or confer any rights, privileges, or benefits for or on any person. While "Food Labeling: Questions and Answers Volume II; A Guide for Restaurants and Other Retail Establishments" represents the best advice of FDA, it does not have the force and effect of law. The interpretations presented are obviously subject to the requirements of law both in the statute and in the regulations.

The Guide

The Guide presents answers to a range of questions, including questions about the application of exemptions and other special labeling provisions in restaurants, about the format for nutrition labeling when it is required, and about other issues concerning the nutrition labeling of retail foods. The Guide also responds to questions about the use of nutrient content claims and health claims on restaurant and other retail foods. It explains how to determine whether there is a reasonable basis for a claim, what foods to use as reference foods, and how to determine reference amounts.

Sample Questions

Question: How does FDA define "restaurants"?
Answer: "Restaurants" include conventional full service restaurants and other establishments where food is sold for immediate, on-site consumption (e.g., institutional food service, delicatessens, and catering where there are facilities for immediate consumption on the premises) and establishments where foods are generally consumed immediately where purchased or while walking away (e.g., lunch wagons, cookie counters in a mall, and vending machines including similar foods sold from convenience stores); and food delivery systems or establishments where ready-to-eat foods are delivered to homes or offices for immediate consumption.

Question: If a restaurant makes a claim for one item, does it need to provide nutrition information for all the foods it serves?
Answer: No. The exemptions from nutrition labeling set out in §§ 101.9 (j)(2)(i) through (iiii) apply to individual food items that are served or sold in a restaurant or similar establishment, not to the establishment. A restaurant need only provide nutrition information for those items that bear a claim. The restaurant may voluntarily provide nutrition information for foods that do not bear a claim.

It should be noted that the final regulations implementing the Nutrition Labeling and Education Act of 1990 (NLEA) currently apply to all forms of restaurant labeling *except for menus*. Thus, a claim on a menu does not trigger FDA's nutrition labeling or claims requirements. However, States are not prohibited from enforcing the requirements with respect to menus. Furthermore, in the **Federal Register** of June 15, 1993 (58 FR 33055), FDA published a proposal to remove exemp-

tion for claims on menus. Should the agency publish a final regulation deleting the menu exemption, the requirements discussed herein for non-menu labeling (e.g., signs, posters, placards, brochures, banners, etc.) will apply to all forms of labeling, including menus.

Question: A restaurant serves food that is commercially manufactured and packaged and labeled. The food is served to consumers in the form it was purchased by the restaurant, e.g., individual serving size packages of condiments are placed in a bowl for consumer use. Would FDA hold the restaurant that serves the food responsible if the label of the food does not meet FDA's requirements, for example, if a package of salad dressing bears a "lowfat" claim but fails to bear nutrition information?

Answer: FDA requires that the label of a food sold in packaged form identify conspicuously the name and place of business of the manufacturer, packer, or distributor (§ 101.5). The firm that is so identified is generally the firm that is responsible for insuring that the food is properly labeled.

Question: Does a restaurant have to use the Nutrition Facts format to provide nutrition information for a food that bears a claim?

Answer: No. FDA is not requiring full nutrition labeling for restaurant foods, nor is it requiring that nutrition information be presented in the Nutrition Facts format. Because restaurant foods tend to be prepared or sold differently from foods from others sources, FDA is providing flexibility for restaurants in how they determine the nutrient content of a food (e.g., using a cookbook, reliable nutrient data base, or other reasonable bases) and in how this information may be presented to consumers. Information on the nutrient amounts that are the basis for the claim (e.g., "low fat, this meal provides less than 10 grams of fat") may serve as the functional equivalent of complete nutrient labeling (§ 101.10).

Question: Does nutrition information have to appear on the same labeling that bears the claim?

Answer: No. Nutrition information for restaurants foods may appear on the same or different labeling from that which bears the claim. Nutrition information may be presented in various forms, including those specified in § 101.9 (Nutrition Facts), §101.45 (e.g., displayed at point of purchase by an appropriate means, such as affixing it to the food, by posting a sign, or by making the information readily available in a brochure, notebook, or leaflet, in close proximity to the foods), and by other reasonable means, such a orally by waiters or waitresses. (The agency notes, however, that to ensure that the information is presented accurately by waitpersons the nutrition information should also be maintained in written form by the restaurant management.)

Question: When making a claim for a food, does a restaurateur have to have the food that bears the claim analyzed by a lab to determine its nutrient content?

Answer: No. A restaurant food may bear a nutrient content claim or health claim if the restaurateur has a "reasonable basis" for believing that the food meets the definition for the claim. If a restaurateur labels a food "low fat," for example, he or she must have a reasonable basis for believing that the food complies with FDA's definition for "low fat," i.e., that it contains no more than 3 g of fat per reference amount customarily consumed or, in the case of meals and main dishes, no more tan 3 g of fat per 100 g.

Question: Will FDA require prior approval for labeling that bears a claim?

Answer: No. FDA does not have the authority to require prior approval of restaurant labeling that bears a nutrient content claim, health claim, or other nutrition information.

Question: Will restaurants be required to have claim bearing foods "certified' by a third party or an independent dietary professional?
Answer: No. FDA has provided broad flexibility in establishing the "reasonable basis" criterion for restaurant foods. Thus, while some restaurateurs may choose to work with a third party to modify recipes or revise labeling, there is no requirement to do so. Restaurants should be able to make their own determinations once they are familiar with the claims requirements.

Question: Many food service items are partially or wholly processed when they are purchased for use in a restaurant or similar establishment. Thus, it is difficult for the restaurant to keep track of the sodium content of foods. It may also be difficult for a restaurant to monitor the use of sodium in the cooking process and to develop recipes for "low sodium" foods that taste good. How will these problems be addressed in implementing the new requirements?
Answer: FDA does not intend to impose an unrealistic regime (e.g., to require exacting measurements or strict portion controls) in restaurants. However, the agency is requiring that a restaurant have a reasonable basis for believing that a food meets the nutrient requirements for a claim, and that it be able to provide reasonable assurances that the preparation of the food adheres to the basis for the claim. If a restaurateur has no knowledge of, or control over, the sodium content of a food, or some other aspect of its nutrient content, he/she should not attempt to make a sodium content or other claim about the nutrient levels in that food.

Question: What is a "reference amount"? Do restaurants need to alter their serving size to be equal to the reference amount?
Answer: The reference amount or reference amount customarily consumed (RACC) is the amount of a food item customarily consumed per eating occasion as determined by FDA for the purpose of establishing realistic and consistent serving sizes for use in food labeling. Reference amounts for 139 different food categories are set out in 21 CFR 101.12. (Reference amounts for meat and poultry products are listed in 9 CFR 317.312.)

Restaurants do not need to alter the size of the portions they serve to be the same as the reference amount, nor does the serving size used

in the labeling for a particular food need to be the same as the reference amount. However, in order to make nutrient content claims or health claims, an individual food must meet the definition for the claim based on the amount of the subject nutrient in an amount of the food equal to its reference amount, e.g., a "low fat" food may contain up to 3 grams of fat per reference amount. When a food's reference amount is small (i.e., 30 g or less or 2 tablespoons or less), the food (e.g., a sauce or

condiment) must also meet the requirements for the claim based on its nutrient content per 50 grams.

Question: Must a restaurant develop recipes for, analyze, and market, a reference food for every food that bears a relative claim?
Answer: No. The reference food may be the restaurant's regular product, or that of another restaurant, that has been offered for sale to the public on a regular basis for a substantial period of time. Nutrient values for a reference food may also be derived from such sources as a valid data base, an average of top national or regional brands, or a market basket norm (§ 101.13(j)(10(ii)).

William B. Schultz
Deputy Commissioner for Policy
[FR Doc. 95-23242] ❖

The document "Food Labeling, Questions and Answers Volume II: A Guide for Restaurants and Other Retail Establishments" is available from the
Superintendent of Documents
U.S. Government Printing Office Washington, D.C. 20402
202-512-1800.
Please request order
No. 017-012-00374-5.

A Young Boy's Letter about Food Labeling

from The Tab newspaper
December 19, 1995

In December 1995, a boy had a severe allergic reaction after consuming a cookie that contained nuts. The label on the cookie did not state that there were nuts in the product. The boy's mouth and throat began to swell, and he went into anaphylactic shock. Fortunately, the boy's father, who is a doctor, was carrying epinephrine, immediately treated the reaction, and transported his son to a hospital emergency room.

On investigation, it was found that a new employee in the bakery where the cookie was manufactured had placed an incorrect label on top of a correct label on the particular package.

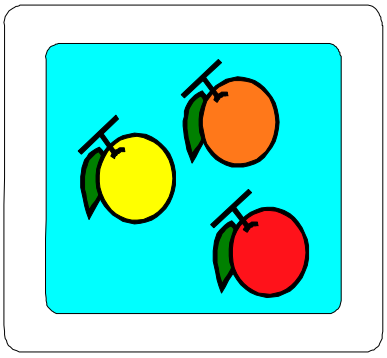
The manufactured agreed to pay to have the following letter printed in the newspaper.

Working Group on Foodborne Illness Control

Leonard Letendre, D.V.M., M.S., R.S.

Introduction

The Massachusetts Department of Public Health employes a multi-divisional approach to the investigation of foodborne illnesses outbreaks. Staff from the Division of Food and Drugs, the Division of Epidemiology and the Division of Diagnostic Laboratories comprise a group known as the *Working Group On Foodborne Illness Control* (WGFIC). The mission of the WGFIC is to control and prevent foodborne illness.The WGFIC meets weekly to share pertinent data and information. The WGFIC, originated in 1986, has grown and has become the front-line group in the investigation of foodborne illness outbreaks throughout the Commonwealth.



Each division has specific responsibilities during the investigation of foodborne illness outbreaks. The WGFIC offers a vehicle to exchange, and not duplicate, information. The prevention of redundancy is important because the quick and accurate identification of the causative agent and its removal is the WGFIC's first priority. In addition, an opportunity for discussion among staff with diverse expertise can accelerate investigations and prevent further spread of the foodborne illness.

The Division of Food and Drugs

The Division of Food and Drugs provides technical assistance to local boards of health in assessing environmental issues effecting foodborne illness. Food contamination occurring during food handling is its major concern. Attempts are made to identify biological, chemical and physical hazards that may have contributed to food contamination and illness. In order to evaluate the process of food preparation, a menu review is usually the technique of choice. Also, whenever possible, observation of food preparation is completed by Food Protection Program and local board of Healthinspection staff in order to identify foodhandler procedure problems.

The Division of Epidemiology

The Division of Epidemiology staff are frequently the first reporting contact for a foodborne illness. Information is obtained by telephone interviews and mailed questionnaires. Data is collected, tabulated, and statistical analysis is provided about the outbreak. A comprehensive written report of all major outbreaks is prepared by the Division. This report includes not only the data related to the outbreak, but also a critical analysis of how this event could have been prevented and what steps should be taken to avoid another occurrence.

The Division of Diagnostic Laboratories

The Division of Diagnostic Laboratories provides scientific and technical support through analysis of food samples and clinical specimens. Foodborne illness outbreaks are often the result of a specific food contaminant and/or cross contamination by a foodhandler. The Laboratories work to identify the responsible agent in either the ingested food or in submitted stool sample(s). By further identifying isolated organisms through serotyping and/or identifying of specific toxins, this Division may assist hospitals and private laboratories which may be involved in the case.

All the information that the Division gathers and identifies about contaminating agents become items in the case database. Through analyses of the data, patterns in foodborne illness outbreaks may be recognized, thus

identifying clusters of similar agents within a specified period of time and/or within a particular geographical location.

An outbreak of *E. Coli* O157:H7 in northeastern Massachusetts during May, June, and July 1996 was quickly recognized by the collaborative surveillance and the ongoing data analysis of all the Divisions comprising the WGFIC.

Local Boards of Health

The WGFIC participates in foodborne illness investigation training that is included as part of food sanitation programs offered to inspectors from local boards of health. On an on-going basis, the WGFIC provides support and assistance to local boards of health, and is not a substitute for local board of health involvement. Local boards of health are encouraged to participate in the activities of the WGFIC.

Expanding Capabilities

The WGFIC is in the process of integrating data-gathering activities from the three Division into one system. This system will provide a more comprehensive method of surveillance and a more efficient way of controlling foodborne illnesses within the Commonwealth of Massachusetts. This new system will be fully operational by 1997. ❖

Trichinosis

Leonard J. Letendre, D.V.M., M.S., R.S.

Recent Case

In December 1995, the Massachusetts Department of Public Health, Division of Epidemiology was notified by a local board of health of a Massachusetts resident diagnosed with trichinosis. The case had occurred in early October in a 28-year old male who at first experienced diarrhea, followed by fever, chills, muscle, bone, and joint pain , mild sore throat, headache, nausea, and occasional vomiting. He was admitted to the hospital six days after onset with dehydration and a temperature between 103°F and 104°F. Diagnostic testing was positive for trichinosis, and after 12 days, the patient was discharged from the hospital.

The suspected cause of the trichinosis was pork meat ingested at a pig roast in September. The pig roasted had been raised and slaughtered at a private farm. It is suspected that the pig had been raised on raw garbage with the trichinella parasite entering the animal via the feed, and the pig not cooked at a high enough temperature for a long enough period of time to kill the embedded parasite. It is not known if others became ill as a result of eating pork at this pig roast.

Overview

*Trichinella spiralis i*s an intestinal parasite associated with the ingestion of under cooked pork. It is cosmopolitan in distribution, occurs in frigid, temperate, and torrid climates, and has been located on every continent except Antarctica. The parasite causes a disease which is referred to as trichinosis,which may be severe and even fatal.

The route of invasion of trichinosis is by the larval stage of the parasite into striated muscle. Active muscle containing a rich blood supply such as those of the diaphragm, ribs, larynx, tongue, eye, and limb are particularly favored. The trichina worm infects many animals, but in the U.S., swine are the most commonly infected. Feeding raw, uncooked garbage to swine has been identified as the major source of infection. Humans are highly susceptible to this parasite, and in recent years, the consumption of under-cooked bear meat responsible for a number of reported cases. Infection is also common in rodents which have access to waste pork. Cats are frequently infected, and dogs less often. Birds are very resistant.

Life Cycle

The life cycle of *trichinella spiralis* has been well documented. The worm enters the digestive tract as an encysted larva in ingested meat. Gastric enzymes then destroy the encasement. Subsequently, the larvae are released and penetrate the mucosa of the small intestine. Several molts occur, and the parasites mature. The adult parasites usually live in the intestinal tract for only 2-3 months.

Reproduction may occur as soon as 40 hours after initial ingestion. The embryos develop in the female worms. Embryos enter circulation by both the circulatory and lymphatic systems and are transported throughout the body of the host. The worms grows rapidly and become sexually differentiated. after entering muscle fibers They finally roll themselves into a spiral and are infective after 17-18 days. A delicate cyst usually develops after 7 or 8 weeks. There is usually one or two worms for each cyst but as many as seven have been reported. Calcification of the cyst occurs seven or eight months later, and death of the worm usually occurs. After 18 months, the entire cyst becomes calcified and a hard calcareous nodule occurs.

Following World War II, there were approximately 400-500 cases of trichinosis reported annually in the United States. Trichinosis became a CDC (Centers for Disease Control and Prevention) reportable disease in l947.

Graphic

Since 1947, there has been a significant decrease in the number of reported cases. Presently approximately 100 cases are reported annually. The significant decrease in the number of reported cases is primarily the result of 1) public awareness of not eating under-cooked pork, 2) the utilization of household freezers, with freezing responsible for larva destruction of the parasite, 3) the imposition of strict processing and sanitation regulations on pork products that are not intended for additional cooking before consumption, and 4) the prohibition of the use of raw, uncooked garbage as swine feed.

In humans, the disease manifests itself in different ways. The first stage of the disease is manifested by gastrointestinal disturbance which includes nausea, abdominal cramps, diarrhea and, occasionally, fever. This stage is usually associated with the presence of the adult worm in the intestinal tract.

The second stage is manifested by extreme muscle pain. This pain is result of cyst formation and larva by-product. This stage results from developing larva penetrating muscle tissue. The severity of clinical symptoms is directly associated with the concentration of both adult intestinal parasites and penetrating larva. It has been estimated that for humans, ingestion of five trichina larvae per gram of body weight is fatal.

The diagnosis of trichinosis requires a thorough clinical history of the patient, including the consumption of raw meat. Muscle biopsy has been utilized in diagnosing advanced stages of the disease. Immunodiagnostic methods for trichinosis, such as serum titers, have been available for many years and gradually have become more and more reliable.

Treatment of trichinosis is dependent upon the stage of the disease. Often the first, or intestinal, stage of the disease goes undetected. Advanced stages of the disease are usually not treated and in most cases self-limited. Pain and fever are controlled with analgesics and antipyretic drugs. Inflammation is controlled by the use of corticosteroids. The use of antihelminthics have not been used with favorable results.

Over the years, education and prevention have made major contributions to the decrease in the number of reported trichinosis cases. Laws have been adopted requiring the cooking of garbage and offal fed to pigs. This procedure prevents the passage of meat scraps, especially pork, containing viable cyst. Public education has provided the most significant impact in the control of this disease. The thorough cooking of fresh pork and meat from wild animals until all parts reach a temperature of 77°C (171°F) or until the pink meat turns gray. Freezing has also been instrumental in parasitic destruction. Holding pork at a temperature of -15°C (+5°F) for 30 days or -25°C (-13°F) or lower for 10 days will effectively destroy all common types of *Trichinella* cysts.

People who eat bear meat must be cook the meat thoroughly before consumption, since bear meat carries a high probability of carrying trichina.

The raising of swine by private individuals for consumption continues to be a common practice, not only in rural areas, but also in urban and suburban communities. The use of raw, uncooked garbage as swine feed should be discouraged, and replaced with grain as the feed of choice. In any event, if garbage is to be used as swine feed, the garbage should be boiled, or cooked to 212°F, for 30 minutes. Finally, to insure trichinella-free pork, sausages, blood and all meat derived from a home-raised swine must be cooked to 150°F.

The author wishes to thank Richard Knowlton, Division of Epidemiology, Massachusetts Department of Public Health for providing information about the 1995 trichinella case in Massachusetts.❖

Minimizing Risks in Swimming Pools, Spas and Hot Tubs

Hillel Liebert, M.S.W., C.H.O., Charles V. Rudnick, R.S., and Howard S. Wensley, M.S., C.H.O.

Why Regulate?

Improperly operated, improperly equipped and improperly supervised swimming pools, spas and hot tubs have been implicated in the spread of disease and the cause of serious injury and death. Regulation and inspection address the areas of water quality and physical safety - we cannot concentrate on one of these areas to the exclusion of the other if we are to properly fulfill our health protection functions.

Deaths and Injuries

Every year fatalities and severe injuries occur at pools where there is inadequate supervision and inadequate safety equipment, including protective enclosures.

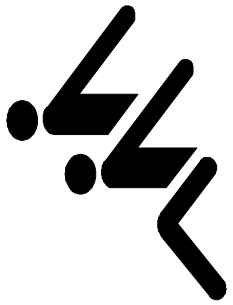
The U.S. Consumer Product Safety Commission (CPSC) reported that from 1994 through March 1996 there were 289 drownings in swimming pools, approximately 50 percent in public or semi-public pools. An additional 80 drownings occurred in spas and hot tubs, 17 percent of them in semi-public facilities. Recently, a fatality at a health club occurred because the victim could not be spotted laying on the bottom of the pool as the pool water was very cloudy.

An estimated 20-30% of the 500-700 spinal cord diving injuries which occur every year, occur in swimming pools; most of the victims are permanently incapacitated. Finally, an increasing number of very severe injuries have been reported in recent years in connection with pool suction drains, e.g., where a grate or protective cover was missing in a children's wading pool.

Another common source of injury to swimmers has been chemical exposure from chlorine gas leaks and chemical burns in the eyes. Pool operators suffer from harmful chemical exposures due to improper use and handling of pool chemicals.

Infections and Illnesses

All people carry a variety of bacteria with them into the swimming pool; some of these can cause gastrointestinal diseases transmitted through the water, and infections may develop in the eye, ear, skin or respiratory system. If he/she showers hastily - or not at all - a person may carry into the pool several times the number of bacteria introduced by those who wash more thoroughly. Further, some children and adults may defecate in the pool, increasing the overall risk to swimmers.



Swimming pool water quality is maintained by continuous addition of mild alkali and chlorine, and by constant recirculation through a filtration system.

Clear pool water containing free residual chlorine at the correct pH will sufficiently limit the numbers of bacteria IF the added burden from the bathers is not overwhelming and IF organic matter such as filter scum, dense sputum and feces does not greatly reduce water clarity.

Special Purpose Pools

Conditions particular to whirlpools, spas and hot tubs involve increased risk of disease transmission and injury. Their smaller size and filter capacity, higher temperatures, high water agitation and turnover rates are generally combined with a higher bather load (ratio of persons to water volume).

The dangers are not only due to numbers of disease carrying bacteria, but also to inadequate monitoring and inadequate adjustment to

the quickly changing water chemistry, i.e., more rapid depletion of safe disinfectant residuals and pH levels.

Drownings have often occurred in hot tubs and spas due to a combination of the relatively hot water temperature and use of alcohol or medications. Injuries often occur as a result of slipping or tripping and falling on the wet exterior surfaces, or through strong suction due to broken or missing drain grates.

Many of these concerns obviously apply also to wading pools, however risks of physical injury are heightened because they serve the youngest children, have water depths of less than two feet and often a concrete bottom.

Other Semi-Public Pool Settings

Relatively lower bather loads often characterize semi-public pools in motels, hotels, schools, summer camps, clubs, housing developments and condominiums. These too often carry increased risk to swimmers, however, due to inadequate supervision and safety enclosures. Children are most likely to be among the swimmers.

What are the Board of Health and Its Inspectors to Do?

Keeping in mind the above reasons for the provisions of Chapter V of the State Sanitary Code, the inspector should also be mindful of the special dangers inherent in each of the various types of pool encountered. For example, nearly unlimited access is sometimes available for indoor semi-public pools due to lack of proper latches on pool gates and doors, and frequent non-enforcement of hours of use. Currently, no state law or regulation requires enclosures around private pools. Boards of health may want to adopt local regulations for this purpose if they are not already in place.

It is also important to remember that each individual spa, hot tub and wading pool unit within a facility is required to obtain a separate permit.

Obvious important areas for inspector attention have always been bacteriological and chemical standards for water quality, including filtration systems. Equally important, however, are physical factors such as informational and warning signs, size and condition of decks, depth markers, condition and location of diving boards, presence and location of water slides, grates in place, easy availability of safety equipment and first aid kits, and training, number and hours of lifeguards.

Regarding the latter, the State Sanitary Code defines the requirements for becoming a lifeguard, but each local board of health determines the need level for lifeguards. Boards should consider pool size and configuration, age ranges of the swimmers, bather-load capacity and the type of building containing the pool. Once a determination is made, it is important that all decisions be uniform for similar pools throughout the community. The required number of lifeguards must be included on the license to operate the pool.

Another important but often neglected area for inspectors is that of swimming pool POLICIES. Beyond bacteria, chemicals and physical pool environment, an inspector should look at and discuss policies regarding children and youth, allocation of special times for older and handicapped swimmers, special times for special activities, hours and training of staff, readiness for emergency needs and bather-load capacity.

Some board of health inspectors have discovered the great power of EDUCATION in obtaining compliance in the inspection process. Getting across the reasons behind specific provisions of Chapter V will often lead the pool operator to act appropriately on his/her own, even when the inspector has left the premises.

Obtaining compliance is also easier when the community observes that the inspector has steadily maintained a fair but firm approach to code enforcement. While listening and displaying understanding of a pool operator's difficulties, the inspector must continue to stick to the provisions of the code, act in a consistent manner and continue to explain as clearly as possible what the code requires and why. ❖

References

Boston Globe, "Boy, 15, Critical in Pool Accident: Tenants Cite Murky Water", July 18, 1996

Kebabjian, R.S., "Disinfection of Public Pools and Management of Fecal Accidents", J Environ Health 1996; 58:8-11

Kowalsky, L., ed., Pool-Spa Operators Handbook, National Swimming Pool Foundation, San Antonio, TX 1990

Mood, Eric W., Prevention of Injury and Disease At Swimming Areas, NEHA, 1982

New York Times, "Paralysis, The High Price of Diving Accidents", July 6, 1994
Pool and Spa News, "Tracking Down the Deadly Three", May 8, 1996, pp. 58-64

Joseph A. Salvato, Environmental Engineering and Sanitation, 4th ed, Ch. 9, "Recreational Areas and Temporary Residences"

State Sanitary Code Chapter V: Minimum Standards for Swimming Pools, 105 CMR 435.000 (rev. 3-24-95, available at Massachusetts State Bookstores in Boston and Springfield)

U.S. Consumer Product Safety Commission, "Above Ground/In Ground Swimming Pools-- Reported Incidents", National Injury Information Clearinghouse, Washington, DC, 1994

U.S. Consumer Product Safety Commission, "Death Certificate File", Directorate for Epidemiology, National Injury Information Clearinghouse, Washington, DC 1994

U.S. Consumer Product Safety Commission, alert letter on suction injuries to young children in wading pools, April 29, 1996 ❖

Commonwealth of Massachusetts
Executive Office of Health and Human Services
Department of Public Health
Division of Food and Drugs
Division of Community Sanitation
305 South Street
Jamaica Plain, MA 02130

William F. Weld
Governor

Argeo Paul Cellucci
Lieutenant Governor

Joseph Gallant
Secretary of Health and Human Services

David H. Mulligan
Commissioner of Public Health

Nancy Ridley
Assistant Commissioner, Bureau of Health Quality Management
Director, Division of Food and Drugs

Richard D. Waskiewicz
Director, Food Protection Program
Division of Food and Drugs

Howard S. Wensley
Director, Division of Community Sanitation

Division of Food and Drugs
Massachusetts Department of Public Health
305 South Street
Jamaica Plain, MA 02130